Mission Rating Speed (MRS) and Terrain Definition Overview

General information

Mission Rating Speed (MRS) (sometimes called Mobility Rating Speed) is a performance statistic that reflects combined on- and off-road operations for a specific mission scenario. The mix of expected percent of each type on-road and off-road operations is pared with the average speed associated with the severity of the operation (challenge level) within each terrain type. The average speed for the given challenge level is known as the V-speed and is expressed in terms of the severity level. V0 is the average speed associated with the lowest challenge level and V100 the highest. The challenge level is the severity of the terrain expressed in percent that is to be considered. For example; V80 is the average speed maintained when challenging the best (highest operating speeds) 80% of the terrain and avoiding the worst (lowest operating speed) 20%.

Equation for MRS

$$MRS = \frac{100}{\frac{\%off}{Voff} + \frac{\%pri}{Vpri} + \frac{\%\sec}{V\sec} + \frac{\%trl}{Vtrl}}$$

Where:

%off = Percent of mission cross country
%pri = Percent of mission using Primary Roads
%sec = Percent of mission using Secondary
%trl = Percent of mission using Trails
Note: %off + %pri + %sec + %trl should add to 100%

Voff = V-speed selected from speed profile for cross country operation
Vpri = V-speed selected from speed profile for primary roads
Voff = V-speed selected from speed profile for secondary roads
Voff = V-speed selected from speed profile for trails

MRS Scenarios

The following are example MRS scenarios defined by TRADOC and currently used for mobility comparisons for the indicated operational areas:

	Operation Mix				**Challenge Level**			
Mission	Ppri	Psrc	Ptrl	Poff	Vpri	Vsec	Vtrl	Voff
Central Europe Scenario Areas								
High-High	0	0	0	100	-	-	-	V_{100}
Tactical-High	10	30	10	50	V_{100}	V_{100}	V_{100}	V_{90}
Tactical-Standard	20	50	15	15	V_{100}	V_{100}	V_{100}	V_{80}

Tactical-Support	30	55	10	5	V_{100}	V_{100}	V_{50}	V_{50}
On-road	35	60	5	0	V_{100}	V_{100}	V_{10}	-
Mid-East Scenario Areas								
High-High	0	0	0	100	-	-	-	V_{100}
Tactical-High	5	20	25	50	V_{100}	V_{100}	V_{100}	V_{90}
Tactical-Standard	15	35	35	15	V_{100}	V_{100}	V_{100}	V_{80}
Tactical-Support	20	40	35	5	V_{100}	V_{100}	V_{80}	V_{50}
On-road	30	40	30	0	V_{100}	V_{100}	V_{50}	-

The various proportions defining the scenarios are related to the density and types of the transportation network existing in the operational area. For instance the scenario for Tactical-Support for an operational area containing few primary and secondary roads would necessarily include a greater percentage of trail and off-road operation than an area with a high density of all weather roads. Also the condition of the existing roads and the severity of the cross-country terrain would influence the challenge levels.

Definitions of Tactical Levels of Mobility

High-High

All off road operation (not a TRADOC defined scenario)

Tactical High

Level of mobility requiring extensive cross-country operations in the ground-gaining and fire-support environment

Tactical Standard

Level of mobility requiring occasional cross-country movement

Tactical Support

Level of mobility requiring infrequent off-road operations over selected terrain with the preponderance of movement on primary and secondary roads

On-Road

All on superhighways, primary and secondary roads, and the best tertiary toads and trails (this is not a TRADOC defined scenario)

Definition of terrain types

Super-Highways

Multi-lane, high speed, high density, limited access roads such as Autobahns and Interstate highways. Surface roughness values ranges from 0.1 inch RMS to 0.3 inch RMS.

Primary Roads

Two or more lanes, all-weather, maintained, hard surface roads with good driving visibility used for heavy and high density traffic. These roads have lanes with a

minimum width of 2.7 m (9 ft.) and the legal maximum GVW/gross combined weight for the country or state is assured for all bridges. Surface roughness values ranges from 0.1 inch RMS to 0.3 inch RMS.

Secondary Roads

Two lane, all-weather, occasionally maintained, hard or loose surface (paved, crushed rock, gravel) roads intended for medium-weight, low density traffic. These roads have lanes with a minimum width of 2.4 m (8 ft.) and no guarantee that the legal maximum GVW/gross combined weight for the country or state is assured for all bridges. Surface roughness values ranges from 0.1 inch RMS to 0.6 inch RMS.

Trails

One lane, dry weather, unimproved, seldom maintained, loose surface roads intended for low-density traffic. Trails have a minimum lane width of 2.4 m (8 ft.), no large obstacles (boulders, stumps, logs…) and no bridging. Surface roughness values ranges from 0.1 inch RMS to 2.8 inch RMS.

Off-Road

Vehicle operations over virgin terrain which has no previous traffic (Cross-Country), and over combat and pioneer trails. Surface roughness values ranges from 0.6 inch RMS to 4.5 inch RMS.